illustrating the invention. The undersigned has submitted herewith proposed drawing corrections to Figures 3A-3F wherein the original photographs have been scanned and digitized. The undersigned respectfully requests that the drawings submitted herewith be entered into the official record of this application.

The use of the American Airlines trademark has been omitted from Figure 3E.

In the Specification

Several changes have been made to the background art portion of the application to make it more readable. No new matter has been added.

Several changes have been made to the first paragraph of the Detailed Description of the Preferred Embodiment. These changes do not constitute new matter in that they merely explicitly define a "live image" as a real time image. It is clear from various parts of the specification (for example, see the last sentence of the first full paragraph on Page 4 of the Specification) that a "live image" is a real time image. For example, on Page 4 of the Specification, first full paragraph, the phrase "any marks or measurements taken while viewing the live image..." is used clearly teaching that live image is synonymous with "real time image." The undersigned believes that by explicitly setting out a portion of the specification where "live image" is defined as a real time image, some potential ambiguity is removed of the claim language discussed hereinafter.

In the Claims

Although none of the claims were rejected as indefinite, in reviewing the claims, the undersigned believed that use of the term "live image" could be interpreted differently from its intended interpretation and accordingly the undersigned believes that by amending the phrase "live image" to now read - - real time image - -, the claims more distinctly point out and particularly claim that which the undersigned believes is the invention. Various other amendments have been made to the claims to make them more readable, but none of these amendments have been made to distinguish over the cited references.
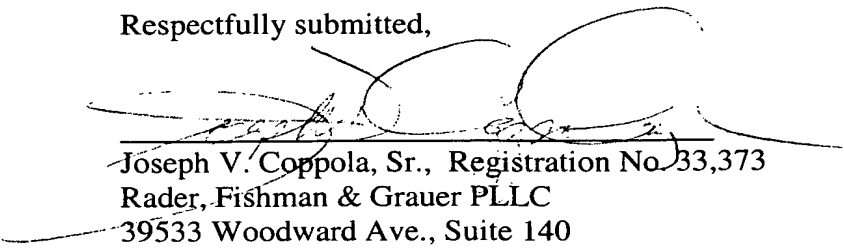
35 USC §103

Claims 1-14, and 17-28 are rejected under 35 USC § 103 as being unpatentable over Devitt et al. in view of Walters et al. and Del Grande et al. None of the references of record

teach or suggest a defect image superimposed on a real time displayed image. The examiner agrees that Devitt does not teach or suggest superimposed images, but the examiner does believe that Walters shows the usage of superimposed images. Specifically, the examiner cites Walters columns 8-9, lines 62-66. The only teaching that the undersigned can find in this section relating to superimposing, relates to the physical superimposing of wire meshes and not the superimposing of images. The undersigned does not understand how the superimposing of two physical wire meshes for the purposes of reflecting electromagnetic energy within a microwave cavity, can even remotely teach or suggest the claimed invention wherein a defect image and a real time image are superimposed upon one another. The undersigned is at a complete loss as to the relevance of Walters as it relates to the claimed invention. Moreover, each of the independent claims (claims 1, 5, 13, and 21) have all been amended, or already contain, the concept that the real time image is displayed. Thus, even if it can be argued that Walters is relevant to non-destructive testing (which it clearly is not), Walters teaches the physical superimposition of wire meshes (which are physical objects) not the superimposition of images of physical objects. Thus, based on this point alone, the undersigned believes that these claims are distinguishable and allowable over the references of record.

None of the references of record teach the concept of superimposing two images upon one another on a display device for the purposes of mapping a defect area of an image sample wherein one of the images is a defect image and the other image is a real time image displayed on a display device.

Accordingly the undersigned believes that all pending claims are now in condition for allowance.

Respectfully submitted,

Joseph V. Coppola, Sr., Registration No. 33,373
Rader, Fishman & Grauer PLLC
39533 Woodward Ave., Suite 140
Bloomfield Hills, Michigan 48304
(248) 594-0650
Attorney for Applicant
Customer No.: 010291

MARKED UP VERSION OF ALL AMENDED CLAIMS

1. (First Amended)   A method for non-destructive evaluation of a sample, comprising the steps of:

obtaining a defect image of said sample, [and a live image of the sample,]

displaying real time image of said sample on a display device, wherein the defect image and the [live] real time image of said sample [having] have a one-to-one correspondence with each other; and

superimposing one of the defect image and the [live] real time displayed image on the other of the defect image and the [live] real time displayed image.

2. (First Amended)   The method of claim 1, further comprising the steps of:

locating a defect in the sample [via] by way of the defect image;

[referencing the defect image according to the located defect; and]

referencing the sample [based on the referenced defect image] while viewing said superimposed [the live] real time image and the referenced defect image on said [a] display device.

3. (First Amended)   The method of claim 2, wherein the step of referencing the [defect image] sample includes the step of marking the sample according to the referenced defect image.

4. (First Amended)   The method of claim 2, wherein the step of referencing the [defect image] sample includes the step of measuring a characteristic of the sample at a selected location.

5. (First Amended) A method for non-destructive evaluation of a sample, comprising the steps of:

obtaining a defect image <u>of said sample,</u>

<u>displaying a real time image of said sample on display device, wherein</u> [and a live image of the sample,] the defect image and the [live image having] <u>real time image have</u> a one-to-one correspondence with each other;

displaying the defect image on a digital display <u>device;</u>

superimposing the defect image onto the [live] <u>display of the real time</u> image [on the display]; and

referencing the sample while viewing<u>, on the display device,</u> the [live] <u>superimposed real time and defect images</u> [image and the defect image on the display].

7. (First Amended) The method of claim 6, further comprising the steps of:

changing the temperature of the sample; and

obtaining at least one defect image over <u>a time period of temperature change of said sample</u> [time to locate a defect in the sample].

8. (First Amended) The method of claim 7, wherein the changing step includes directing a heating pulse onto the sample such that the heat is distributed <u>generally</u> evenly over the sample.

9. (First Amended)   The method of claim 7, wherein the changing step includes directing continuous heat onto the sample such that the heat is distributed <u>generally</u> evenly over the sample.

13. (First Amended)   An apparatus for non-destructive testing/evaluation of a sample, comprising:

a camera that [generates] <u>captures</u> a defect image and <u>generates a real time</u> [a live] image of the sample;

a processor coupled with the camera to digitize the defect image and the [live] <u>real time</u> image;

a display for displaying the digitized defect image and the [live] <u>real time</u> image, wherein the processor and the display include means for referencing the defect image and superimposing one of the defect image and the [live] <u>real time</u> image onto the other of the defect image and the [live] <u>real time</u> image.

17. (First Amended)   A computer readable storage device <u>containing program steps</u> used to [control] <u>direct the operation of a digital computer used for</u> non-destructive testing and evaluation of materials, comprising the steps of:

obtaining a defect image and a [live] <u>real time</u> image of the sample, the defect image and the [live] <u>real time</u> image having a one-to-one correspondence with each other; and

superimposing one of the defect image and the [live] <u>real time</u> image on the other of the defect image and the [live] <u>real time</u> image.

18. (First Amended)   The computer readable storage device of claim 17, further comprising the steps of:

locating a defect in the sample via the defect image;

referencing the defect image according to the located defects; and

referencing the sample after the superimposing step while viewing the [live] <u>real time</u> image and the referenced defect image on a display.

21. (First Amended)   A computer readable storage device for non-destructive evaluation of a sample, comprising the steps of:

obtaining a defect image and a [live] <u>real time</u> image of the sample, the defect image and the [live] <u>real time</u> image having a one-to-one correspondence with each other;

displaying the defect image on a digital display;

superimposing the defect image onto the [live] <u>real time</u> image on the display; and

referencing the sample while viewing the [live] <u>real time</u> image and the defect image on the display.

22. (First Amended)   The computer readable storage device of claim 21, wherein the defect image is an infrared image, and wherein the defect image and the [live] <u>real time</u> image are obtained from an infrared camera.

23. (First Amended)   The computer readable storage device of claim 22, further comprising the steps of:

changing the temperature of the sample; and

obtaining at least one defect image over <u>a period of time where the sample</u>

<u>temperature is changing</u> [time to locate a defect in the sample].

MARKED UP VERSION OF ALL AMENDED SPECIFICATION PARAGRAPHS

The Paragraph Spanning Lines 11-22 on Page 1 of the Specification:

Various methods of non-destructive testing and evaluation (NDT/E) of parts have been developed to detect subsurface defects in a part sample and to measure the depth of subsurface defects. These methods include step thermography, pulse thermography, [pulse thermography,] and other thermographic techniques. All of these techniques involve deliberately changing the temperature of the sample, [allowing the sample to return to equilibrium temperature,] and observing the temperature change of the sample via an infrared (IR) camera as it returns to equilibrium temperature. Anomalous temperature changes that appear in the infrared camera image indicate subsurface defects in the sample; subsurface defects tend to impede the normal heat flow in the sample and will appear as anomalies in the image. Further, because the infrared image showing the defect is transient and may last for only a fraction of a second, the image must be captured (usually with a digital computer) and then verified [with] against the actual sample to locate the exact position of the defect.

The Paragraph Beginning on Line 23 of Page 1, which spans to Line 12 of Page 2 of the Specification:

The actual verification process, usually through a complementary NDT/E process, can be relatively difficult because the infrared defect image of the sample may bear little resemblance to the actual sample. For example, many subsurface defects appear only in the infrared image; to the naked eye, the sample containing the defects often appears perfectly uniform. As a result, a user must attempt to match the infrared image of the subsurface

defect with the actual, unblemished sample surface to pinpoint the location of the defect.

This is further complicated by the fact that the infrared camera lens often distorts the image,

causing straight lines at the periphery of the lens's field of view to appear curved in the

image. To locate and mark the positions of subsurface defects with some precision, prior art

methods include using regularly spaced registration markers on the sample, calculating

complex anamorphic mapping algorithms, or printing a full-size defect image and physically

matching or overlaying the full-size image onto the actual sample. Because the sample may

not have any distinguishing marks that appear in the defect image, precise registration of the

image and the sample's surface can be difficult. In addition, these methods are time-

consuming and are not particularly convenient, and at best they can only approximate the

subsurface defect location due to the image distortion from the infrared camera lens. Further,

measuring the depth of subsurface defects often requires some prior knowledge of the

sample's dimensions or properties, such as the thickness of the sample, the depth of a known

defect, the material's thermal diffusivity, etc. This information is often not available in

practice, making precise depth measurements difficult with known techniques.

**The First Full Paragraph under the heading "Detailed Description of the Preferred
Embodiment:**

Referring to Figure 1, one embodiment of the NDT/E method according to the present

invention can be broken down into four steps. First, a defect image of the sample is obtained

100, digitized and displayed on a computer 102 using a computer program that has a

referencing mechanism, such as drawing tool that allows the user to draw on the defect image

using a mouse, touch screen, light pen, or other pointing device. The user can mark defects

found in the defect image with the drawing tool 103. The defect image, including any marks

made by the user, is then superimposed onto a live image 104, which is also displayed <u>and</u>

<u>maintained</u> on the computer <u>display device (the term "live image" as used throughout this</u>

<u>description is an image displayed in real time on a computer display device, such as a CRT,</u>

<u>such that any markings or movement made by an operator are captured in real time within the</u>

<u>"live image" and are immediately displayed by the display device).</u> The live image is

preferably produced immediately thereafter and using the same lens and camera that

produced the defect image to ensure a one-to-one correspondence between the live image and

the defect image; using the same lens ensures that both images will have the same distortion.

The user then marks the actual sample, using a marking pencil or similar device, while

viewing the live image 106 rather than looking the sample itself. Instead of marking the part,

the user may also use a point measuring device to measure characteristics of the sample, such

as its thickness, and append the data to the image for annotation or calibration purposes. The

defect image and live image can also be simply superimposed one atop the other for

referencing purposes, without any user intervention.